

Claims

- [c1] 1. A valve arrangement for providing pressure control in a combustion engine (1) with a crankcase (11) to which crankcase gases are guided during operation of the engine, said valve arrangement comprising:
valve means (15) for detecting the current pressure in said crankcase (11) and for opening and closing, respectively, a connection (35) between said crankcase (11) and a suction pipe (9) of the engine depending on said detected pressure; and
said valve means (15) comprising: a first valve (19) that assumes a configuration between a first, opened position and a second, closed position depending on detected pressure in the crankcase (11), and a second valve (20) that assumes a condition between a first, opened position and a second, closed position depending on the condition of said first valve (19), and said second valve (20) opens said connection (35) when the first valve (19) assumes a closed position, and said second valve (20) closes said connection (35) when the first valve (19) assumes an opened position.
- [c2] 2. The valve arrangement as recited in claim 1, wherein

said first valve (19) assumes a closed position when the pressure in the crankcase (11) exceeds a predetermined maximum permissible value, and said first valve (19) assumes an opened position when the pressure in the crankcase (11) falls below a predetermined minimum permissible value.

- [c3] 3. The valve arrangement as recited in claim 1, wherein said first valve (19) comprises a flexible diaphragm (21) which, depending on said detected pressure, causes a valve element (24a) to open and close an opening (25) which connects the first valve (19) with the second valve (20), and the second valve (20) comprises a flexible diaphragm (29) which, depending on the condition of the first valve (19), opens and closes said connection (35).
- [c4] 4. The valve arrangement as recited in claim 3, wherein said flexible diaphragms (21, 29) are rubber diaphragms.
- [c5] 5. The valve arrangement as recited in claim 1, wherein said second valve (20) comprises a spring element (36) that influences the second valve (20) with a force biased toward closing connection (35).
- [c6] 6. The valve arrangement as recited in claim 1, wherein said valve device (15) detects the pressure in the crankcase (11) via a pipe (16) connected from the

crankcase (11) to the first valve (19).

[c7] 7. The valve arrangement as recited in claim 3, wherein said diaphragm (21) in the first valve (19) separates a first chamber (27) from a second chamber (28), and wherein the first chamber (27) is connected to the surrounding atmosphere and the second chamber (28) is connected to the crankcase (11), and said diaphragm (29) in the second valve (20) separates a third chamber (32) from a fourth chamber (33), and wherein the third chamber (32) is connected with the suction pipe (9) via a restrictor connection (34) and the fourth chamber (33) is connected with the suction pipe (9) and the crankcase (11), via said connection (35) , and wherein the valve element (24a) in the first element (19) cooperates with a connection (25) between the second chamber (28) and the third chamber (32) which can be opened.

[c8] 8. The valve arrangement as recited in claim 1, further comprising an engine having at least one separation device (12, 13, 14) for separating small particles from said crankcase gases, which separation device (13, 14, 15) is provided between the crankcase (11) and the suction pipe (9) and said connection (35) is provided downstream of said separation device (12, 13, 14).

[c9] 9. An engine arrangement comprising:

an engine with a crankcase (11) and a connection for ventilating crankcase gases from the crankcase (11) to a suction pipe (9) via a connection (35) which can be opened;

a valve device (15) configured to detect the current pressure in said crankcase (11) and for opening and closing, respectively, a connection (35) between said crankcase (11) and a suction pipe (9) of the engine depending on said detected pressure; and

said valve device (15) comprising: a first valve (19) that assumes a configuration between a first, opened position and a second, closed position depending on detected pressure in the crankcase (11), and a second valve (20) that assumes a condition between a first, opened position and a second, closed position depending on the condition of said first valve (19), and said second valve (20) opens said connection (35) when the first valve (19) assumes a closed position, and said second valve (20) closes said connection (35) when the first valve (19) assumes an opened position.

- [c10] 10. A method for pressure control in a combustion engine (1), said method comprising:
feeding crankcase gases during operation of the engine from a crankcase (11) forming part of the engine;
detecting the current pressure in said crankcase (11) and

opening and closing a connection (35) between the crankcase (11) and a suction pipe (9) of the engine depending on the detected pressure;
controlling a first valve (19) between a first, opened position and a second, closed position depending on said detected pressure in the crankcase (11);
controlling a second valve (20) between a first, opened position and a second, closed position depending on the condition of said first valve (19); and
opening said connection (35) when the first valve (19) assumes a closed position and closing said connection (35) when the first valve (19) assumes an opened position.

[c11] 11. The method as recited in claim 10, further comprising:

closing the first valve (19) when the pressure in the crankcase (11) exceeds a predetermined maximum permissible value, and

opening the first valve (19) when the pressure in the crankcase (11) falls below a predetermined minimum permissible value.